Chapter 6 - Electricity for Everyone

Team 1			Team 2		
13/24	Julissa B.*	8	5/24	Samantha D.	2
18/24	Jordan J.	6	15/24	Delia O.	8
18/24	Amy P.*	2	16/24	Valeria S.*	12
23/24	Paola G.	16	1/24	Vanessa R.	1
			1/24	Dalia G. (Bed Rest)	

*Buzzer/infant care

Chapter 6 - Electricity for Everyone

4/30/14

Chapter Challenge (p.594)

Max. 3 kWh per day   max. 2400 W at one time

appliance package - basic needs
options - family size, climate, luxury

6.1 Generating Electricity (p.598) 5/01/14

WDYS A guy is holding a lightbulb that is lit but not attached to anything, a crank device puts energy into wires that you attach to something else, confused dog, confused ground hog, boy has thinking cloud w/ ? that looks like a lightbulb, boy holding something that has knobs and looks like lightbulb goes into it

WDYT How generated? Lots of wires, solar panels, wind turbines, water turbines, burning: coal, wood, gas, oil nuclear energy

Sources: sun, water, wind, coal + fossil fuels, uranium

6.1 Generating Electricity (p.598) 5/01/14

IWBAT trace energy transformations, plan a model for electricity, construct a circuit that lights a bulb, and adjust the brightness of a light bulb with a hand generator. I will do this through team experiments and discussions with my team and the whole class. I will demonstrate my understanding through answering questions in the Physics Talk, Checking Up, and/or Physics to Go.

6.1 Generating Electricity (p.598) 5/01/14

Investigate

Answer all non-list questions in complete sentences.

A2. List five for each category (use & eliminate).

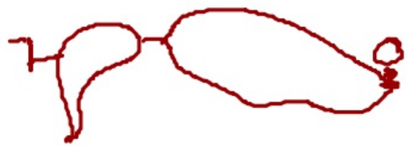
B1.a) Draw this on paper to turn in.
B4. Draw this on paper to turn in.
B5. Have each team member write the answer to a different part. (3 parts, 3 people typing answers)

IWBAT trace energy transformations, plan a model for electricity, construct a circuit that lights a bulb, and adjust the brightness of a light bulb with a hand generator.

6.1 Generating Electricity (p.598)   5/01/14

Physics Talk (p.600)

electrical circuit - a closed looping path for electricity to travel along



 Gear

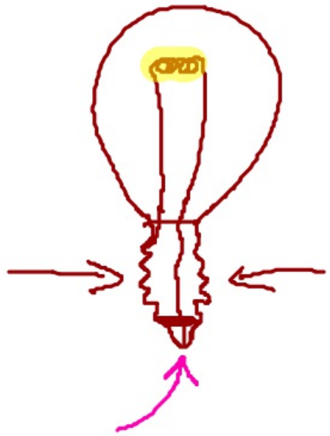
Energy transformations

- Chemical potential energy
- Kinetic energy
- mechanical energy
- electrical
- Light & heat

IWBAT trace energy transformations, plan a model for electricity, construct a circuit that lights a bulb, and adjust the brightness of a light bulb with a hand generator.

6.1 Generating Electricity (p.598)

5/01/14



More electricity through the same filiment causes more light and heat to be produced.

More resistance causes more electrical energy converted to heat + light.

IWBAT trace energy transformations, plan a model for electricity, construct a circuit that lights a bulb, and adjust the brightness of a light bulb with a hand generator.

6.1 Generating Electricity (p.598)

5/01/14

Physics to Go (p. 604) # 1, 3-6, 10

IWBAT trace energy transformations, plan a model for electricity, construct a circuit that lights a bulb, and adjust the brightness of a light bulb with a hand generator.

6.2 Modeling Electricity: The Electron Shuffle (p.606) 5/05/14

WDYS Pretzel circle - pretzels going to the guy who is dressed like a lightbulb (jacket), pretzels left w/ lightbulb guy, students in circuit return to pretzel vendor w/o pretzels to get more, light bulb guy looks like he has a lot of energy, circuit kids are taking long strides to hurry, all are happy looking, but not as excited as bulb guy

WDYT electricity is a form of energy, light produced by bulbs is electricity, lightning is electricity

Switches allow it to move or stop it

Switches break a circuit

Longitudinal waves

6.2 Modeling Electricity: The Electron Shuffle (p.606) 5/05/14

IWBAT develop a physical model for electric current and potential energy and apply the physical model to trace the flow of electric current in series circuits. I will do this through team experiments and discussions with my team and the whole class. I will demonstrate my understanding through answering questions in the Physics Talk, Checking Up, and/or Physics to Go.

6.2 Modeling Electricity: The Electron Shuffle (p.606) 5/05/14

Investigate

This requires the *active* participation of EVERYONE.

Coulomb "koo lom"

Joule "jewel"

Ampere "am peer" Amp

IWBAT develop a physical model for electric current and potential energy and apply the physical model to trace the flow of electric current in series circuits.

6.2 Modeling Electricity: The Electron Shuffle (p.606) 5/06/14

Physics Talk (p.609)

Charge picks up energy at the battery and drops it at a device (e.g. lightbulb). Charge is not used up.

Stored energy is potential energy

batteries - provide energy

resistors - slow down the flow of current

Current - the flow of energy through a circuit

Coulomb - the SI measurement of charge

6.25×10^{18} electrons

Voltage - energy (Joules) per Coulomb of charge

Amperes - $1A = 1C/s$

Volts - $1V = 1J/C$

IWBAT develop a physical model for electric current and potential energy and apply the physical model to trace the flow of electric current in series circuits.

6.2 Modeling Electricity: The Electron Shuffle (p.606) 5/06/14

Series circuit – an electrical circuit where the resistors are connected in a single path

Watts - $1\,W = 1\,J/s$ power

IWBAT develop a physical model for electric current and potential energy and apply the physical model to trace the flow of electric current in series circuits.

6.2 Modeling Electricity: The Electron Shuffle (p.606) 5/06/14

Checking Up (p.610) #1-4

Physics to Go (p.612) # 1, 2, 3

IWBAT develop a physical model for electric current and potential energy and apply the physical model to trace the flow of electric current in series circuits.

6.3 Series and Parallel Circuits: Lighten Up (p.614) 5/07/14

WDYS Girl has 5 lights + TV on, girl loosens bulb from ceiling light, everything goes out, low voltage possible, no switch

WDYT Most of the time the rest of the lights remain on.

The energy that was being used by the now extinguished bulb is shared by the rest of the bulbs.

Multiple paths which can go around or bypass the extinct bulb.

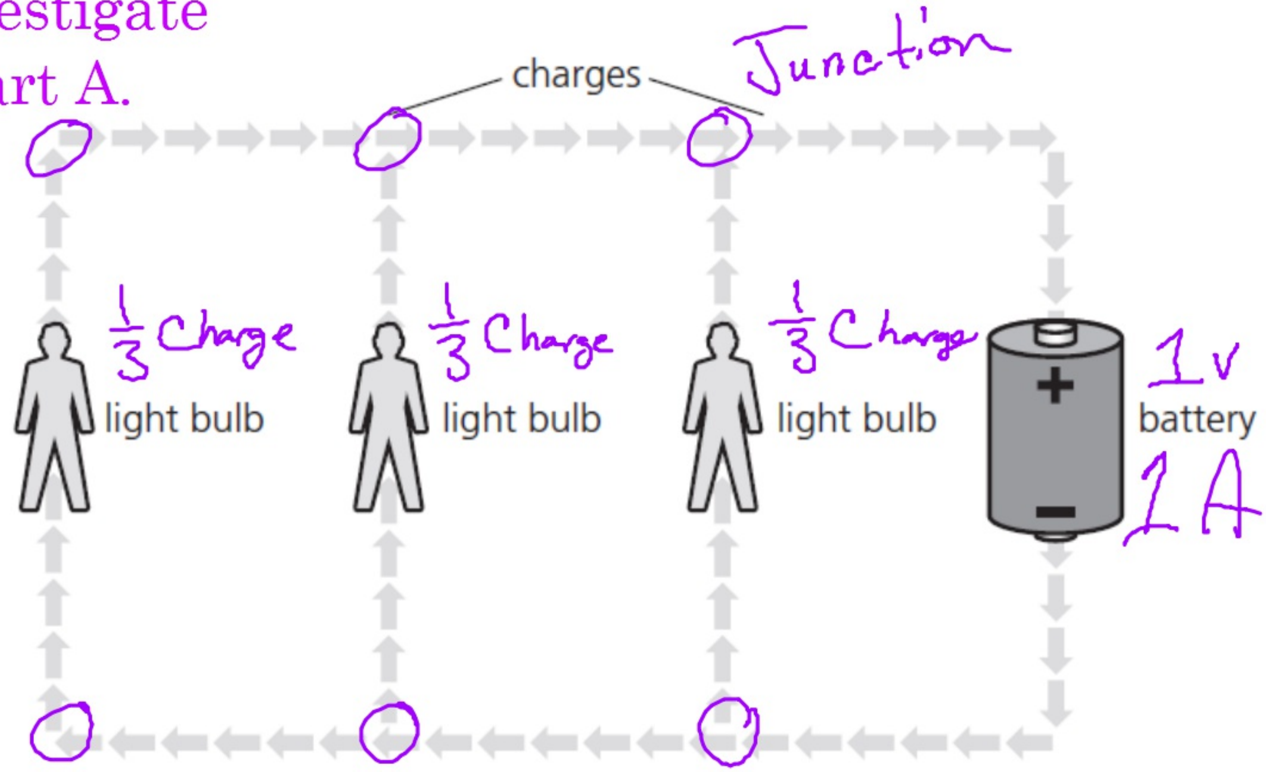
6.3 Series and Parallel Circuits: Lighten Up (p.614) 5/07/14

IWBAT compare series and parallel circuits, recognize generator output limit, and modify the Electron-Shuffle model of electricity. I will do this through team experiments and discussions with my team and the whole class. I will demonstrate my understanding through answering questions in the Physics Talk, Checking Up, and/or Physics to Go.

6.3 Series and Parallel Circuits: Lighten Up (p.614) 5/07/14

Investigate

Part A.



IWBAT compare series and parallel circuits, recognize generator output limit, and modify the Electron-Shuffle model of electricity.

6.3 Series and Parallel Circuits: Lighten Up (p.614) 5/08/14

Physics Talk (p.617)

3 resistors in parallel, 6V power source

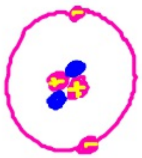
All 3 resistors get 6V, but only a part of the charge goes to each resistor.

The current is split between the resistors. If the resistors are identical, then the current is split equally between the resistors.

IWBAT compare series and parallel circuits, recognize generator output limit, and modify the Electron-Shuffle model of electricity.

6.3 Series and Parallel Circuits: Lighten Up (p.614) 5/08/14

TWO kinds of charges: positive + negative
positive charge: proton, negative charge: electron



$1C = 6.25 \times 10^{18}$ electrons

1 electron has 1.6×10^{-19} C

$1A = 1\ C/s$

IWBAT compare series and parallel circuits, recognize generator output limit, and modify the Electron-Shuffle model of electricity.

6.3 Series and Parallel Circuits: Lighten Up (p.614) 5/08/14

Checking Up (p.618) #1-4

Physics to Go (p.621) # 1, 2, 4, 6, 9, & 10

IWBAT compare series and parallel circuits, recognize generator output limit, and modify the Electron-Shuffle model of electricity.

6.4 Ohm's Law: Putting up a Resistance (p.623)   5/12/14

WDYS Mystery box, dog w/glowing nose, cat + 2 people look perplexed, blonde guy looks like he's planning dinner, Voltage + Current values on board are increasing

WDYT brighter - more Watts, more Voltage, more Current, type of light bulb

determines how much current in a circuit - Voltage

6.4 Ohm's Law: Putting up a Resistance (p.623) 5/12/14

IWBAT calculate the resistance of an unknown resistor given the voltage drop and current, construct a series circuit, use a voltmeter and ammeter in a series circuit accurately, and express the relationship between voltage and current for a resistor that obeys Ohm's Law in a graph. I will do this through team experiments and discussions with my team and the whole class. I will demonstrate my understanding through answering questions in the Physics Talk, Checking Up, and/or Physics to Go.

6.4 Ohm's Law: Putting up a Resistance (p.623) 5/12/14

Investigate

Read step 1 thoroughly and observe the diagram carefully.

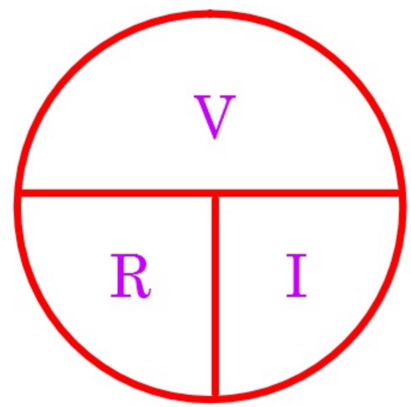
IWBAT calculate the resistance of an unknown resistor given the voltage drop and current, construct a series circuit, use a voltmeter and ammeter in a series circuit accurately, and express the relationship between voltage and current for a resistor that obeys Ohm's Law in a graph.

6.4 Ohm's Law: Putting up a Resistance (p.623) 5/14/14

Physics Talk (p.625)

The ratio of voltage to current is the same for a single resistor no matter the voltage put through it.

$$R(\Omega) = \frac{V(V)}{I(A)}$$ Ohm's Law



IWBAT calculate the resistance of an unknown resistor given the voltage drop and current, construct a series circuit, use a voltmeter and ammeter in a series circuit accurately, and express the relationship between voltage and current for a resistor that obeys Ohm's Law in a graph.

6.4 Ohm's Law: Putting up a Resistance (p.623)   5/14/14

Checking Up (p.626) #1-3

Physics to Go (p.629) # 1-4

IWBAT calculate the resistance of an unknown resistor given the voltage drop and current, construct a series circuit, use a voltmeter and ammeter in a series circuit accurately, and express the relationship between voltage and current for a resistor that obeys Ohm's Law in a graph.

6.5 Electric Power: Load Limit (p.631) 5/14/14

WDYS / 5 appliances running at the same time, circuit breaker is freaking out while trying to keep up + might explode, loaded power strip

WDYT fuse / circuit breaker - to turn off the electricity being used and can start a fire

too many appliances used at once because too many volts are being used, too many amps

6.5 Electric Power: Load Limit (p.631) 5/15/14

IWBAT define power, insulator, and conductor; I will apply the equation for power to determine the power or current needed for a common household appliance; calculate the power limit of a 120-V household circuit; differentiate between a fuse and a circuit breaker; and identify the need for the fuses and circuit breakers in a home. I will do this through team experiments and discussions with my team and the whole class. I will demonstrate my understanding through answering questions in the Physics Talk, Checking Up, and/or Physics to Go.

6.5 Electric Power: Load Limit (p.631) 5/15/14

Investigate

This will be a discussion instead of hands-on. You are still required to make notations in your notebook.

IWBAT define power, insulator, and conductor; I will apply the equation for power to determine the power or current needed for a common household appliance; calculate the power limit of a 120-V household circuit; differentiate between a fuse and a circuit breaker; and identify the need for the fuses and circuit breakers in a home.

6.5 Electric Power: Load Limit (p.631) 5/15/14

Physics Talk (p.633)

Power – the ability to do work

energy used per second

$P(\text{Watts}) = V(V)\,I(A)$

$W = V \cdot A = \frac{J}{C} \cdot \frac{C}{s} = \frac{J}{s}$

$W = J/s$ $15\,W = 15\,J/s$

$\frac{15}{1} \cdot \frac{J}{s}$

$P = V \cdot I$ $V = \frac{P}{I}$ $I = \frac{P}{V}$

IWBAT define power, insulator, and conductor; I will apply the equation for power to determine the power or current needed for a common household appliance; calculate the power limit of a 120-V household circuit; differentiate between a fuse and a circuit breaker; and identify the need for the fuses and circuit breakers in a home.

6.5 Electric Power: Load Limit (p.631) 5/15/14

Conductors – easily allow electricity (energy) to pass

Insulators – highly resistant to electricity/energy passing through

Load Limit = 2400 W

IWBAT define power, insulator, and conductor; I will apply the equation for power to determine the power or current needed for a common household appliance; calculate the power limit of a 120-V household circuit; differentiate between a fuse and a circuit breaker; and identify the need for the fuses and circuit breakers in a home.

6.5 Electric Power: Load Limit (p.631)

5/15/14

Checking Up (p.638) #1-4

Physics to Go (p.641) # 5, 6, & 14

IWBAT define power, insulator, and conductor; I will apply the equation for power to determine the power or current needed for a common household appliance; calculate the power limit of a 120-V household circuit; differentiate between a fuse and a circuit breaker; and identify the need for the fuses and circuit breakers in a home.

6.6 Current, Voltage, and Resistance in Parallel and Series Circuits: Who's in Control? (p.644)

5/16/14

WDYS Two ladies on opposite sides of the room and both are trying to turn off or on the lights, one is doing the opposite of the other - two switches for one light, dog wishes they would quit

WDYT room lights - motion in the room
AC/furnace/heater - temperature
Cell phone screen - inactivity
Street lights - darkness
headlights/DRL - Car is running

6.6 Current, Voltage, and Resistance in Parallel and Series Circuits: Who's in Control? (p.644)

5/16/14

IWBAT assemble a switch in a circuit with parallel components to control a particular lamp, use the conservation of energy to determine how currents and voltages are distributed in series and parallel circuits, and use Ohm's law to derive equations for the total resistance of multiple resistors in series and parallel circuits. I will do this through team experiments and discussions with my team and the whole class. I will demonstrate my understanding through answering questions in the Physics Talk, Checking Up, and/or Physics to Go.

6.6 Current, Voltage, and Resistance in Parallel and Series Circuits: Who's in Control? (p.644) 5/16/14

Investigate

- I recommend using the same color leads for each group of wires: #1-4; #7-10; #5, 11, & 13; and #6, 12, & 14.
- Spread this setup across the table; do not bunch it up.
- You must create the diagrams before you may proceed to the next step each time.

IWBAT assemble a switch in a circuit with parallel components to control a particular lamp, use the conservation of energy to determine how currents and voltages are distributed in series and parallel circuits, and use Ohm's law to derive equations for the total resistance of multiple resistors in series and parallel circuits.

6.6 Current, Voltage, and Resistance in Parallel and Series Circuits: Who's in Control? (p.644) 5/19/14

Physics Talk (p.646)

$1 A = 1 C/s$ $1 V = 1 J/C$

Current in a series circuit $I_T = I_1 = I_2 = I_3$

Current in a parallel circuit $I_T = I_1 + I_2 + I_3$,
if the resistors are the same then I_{1-3} are equal shares.

Voltage in a series circuit $V_T = V_1 + V_2 + V_3$

Voltage in a parallel circuit $V_T = V_1 = V_2 = V_3$

IWBAT assemble a switch in a circuit with parallel components to control a particular lamp, use the conservation of energy to determine how currents and voltages are distributed in series and parallel circuits, and use Ohm's law to derive equations for the total resistance of multiple resistors in series and parallel circuits.

6.6 Current, Voltage, and Resistance in Parallel and Series Circuits: Who's in Control? (p.644)

5/19/14

Series $I_T = I_1 = I_2 = I_3$ $R_T = R_1 + R_2 + R_3$

$V_T = V_1 + V_2 + V_3$

Parallel $I_T = I_1 + I_2 + I_3$ $\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$

$V_T = V_1 = V_2 = V_3$

Power $P_T = V_T I_T$

IWBAT assemble a switch in a circuit with parallel components to control a particular lamp, use the conservation of energy to determine how currents and voltages are distributed in series and parallel circuits, and use Ohm's law to derive equations for the total resistance of multiple resistors in series and parallel circuits.

6.6 Current, Voltage, and Resistance in Parallel and Series Circuits: Who's in Control? (p.644)

5/19/14

Checking Up (p.654) #1-3

Physics to Go (p.658) # 7, 9, & 10

IWBAT assemble a switch in a circuit with parallel components to control a particular lamp, use the conservation of energy to determine how currents and voltages are distributed in series and parallel circuits, and use Ohm's law to derive equations for the total resistance of multiple resistors in series and parallel circuits.

6 Mini-challenge (p.662) 5/20/14

Maximum 3 kWh/day

Maximum 2400 W at any one time

Appliance package: Basic needs

- Options: Family size, Climate, Luxury

Written training manual must include:

- How to stay within energy budget of 3 kWh/day
- How to not exceed 2400 W at one time.

Consider these appliance categories:

- Cooking
- Lighting
- Cleaning
- Climate control
- Safety
- Entertainment

6.7 Laws of Thermodynamics: Too hot, too cold, just right (p.664)

5/21/14

WDYS 3 bears making hot chocolate, middle bear spilled half + half, Goldilocks is stalking the bears, each bear is adding a different amount: too hot - very little, too cold - a "butt load", Just right - something in between

WDYT Temp. of coffee, Temp. of milk
kind of milk (cow vs. almond vs. soy, milk vs. cream)
temp. of room, time after pouring
different amount of milk

6.7 Laws of Thermodynamics: Too hot, too cold, just right (p.664) 5/21/14

IWBAT assess experimentally the final temperature when two liquids of different temperatures are mixed, calculate the heat lost and the heat gained of two objects after they are placed in thermal contact, discover if energy is conserved when two objects are placed in thermal contact and reach an equilibrium temperature, and explain the concept of entropy as it relates to objects placed in thermal contact. I will do this through team experiments and discussions with my team and the whole class. I will demonstrate my understanding through answering questions in the Physics Talk, Checking Up, and/or Physics to Go.

6.7 Laws of Thermodynamics: Too hot, too cold, just right (p.664)

5/21/14

Investigate

- Be extremely careful of the hot materials.
- Measure accurately.
- Use only Celsius/centigrade units for temperature.
- 3b) Switch X and Y axes from the directions in the book.
- Skip steps 4-6.
- Read Physics Talk section "Specific Heat" (pp.666-8)

IWBAT assess experimentally the final temperature when two liquids of different temperatures are mixed, calculate the heat lost and the heat gained of two objects after they are placed in thermal contact, discover if energy is conserved when two objects are placed in thermal contact and reach an equilibrium temperature, and explain the concept of entropy as it relates to objects placed in thermal contact.

6.7 Laws of Thermodynamics: Too hot, too cold, just right (p.664) 5/22/14

Physics Talk (p.666)

Law of Conservation of Energy

Energy is neither created nor destroyed, it only changes form

In a <u>closed</u> system the total amount of energy does not change.

$$\Delta Q_h + \Delta Q_c = 0$$

Key Pad
Degree Symbol (°) ALT+0176

IWBAT assess experimentally the final temperature when two liquids of different temperatures are mixed, calculate the heat lost and the heat gained of two objects after they are placed in thermal contact, discover if energy is conserved when two objects are placed in thermal contact and reach an equilibrium temperature, and explain the concept of entropy as it relates to objects placed in thermal contact.

6.7 Laws of Thermodynamics: Too hot, too cold, just right (p.664)

5/23/14

Specific Heat - the heat energy required to raise the temp. of 1g of a substance 1°C measured in J

$\Delta Q = mc\Delta T$

c = specific heat for material J/g°C

1mL H_2O has 1g of mass

$$(mc\Delta T)_h + (mc\Delta T)_c = 0$$

$$mc(T_f - T_h) + mc(T_f - T_c) = 0$$

$$100c(30-45) + 150c(30-21) = 0$$

$$-1500c + 1350c = 0$$

IWBAT assess experimentally the final temperature when two liquids of different temperatures are mixed, calculate the heat lost and the heat gained of two objects after they are placed in thermal contact, discover if energy is conserved when two objects are placed in thermal contact and reach an equilibrium temperature, and explain the concept of entropy as it relates to objects placed in thermal contact.

6.7 Laws of Thermodynamics: Too hot, too cold, just right (p.664) 5/23/14

Temperature and heat

Temperature measures average kinetic energy

Heat is energy transferred from one object to another and affecting the temperature

Zeroth Law of Thermodynamics

$T_A = T_B$ and $T_B = T_C$ then $T_A = T_C$

IWBAT assess experimentally the final temperature when two liquids of different temperatures are mixed, calculate the heat lost and the heat gained of two objects after they are placed in thermal contact, discover if energy is conserved when two objects are placed in thermal contact and reach an equilibrium temperature, and explain the concept of entropy as it relates to objects placed in thermal contact.

6.7 Laws of Thermodynamics: Too hot, too cold, just right (p.664)

5/23/14

First Law of Thermodynamics

$$\Delta Q = mc\Delta T = mc(T_f - T_i)$$

The thermal energy added to a system is equal to the change in internal energy plus work done by the system

IWBAT assess experimentally the final temperature when two liquids of different temperatures are mixed, calculate the heat lost and the heat gained of two objects after they are placed in thermal contact, discover if energy is conserved when two objects are placed in thermal contact and reach an equilibrium temperature, and explain the concept of entropy as it relates to objects placed in thermal contact.

6.7 Laws of Thermodynamics: Too hot, too cold, just right (p.664)

5/23/14

Second Law of Thermodynamics

Thermal energy is transferred from hot objects to cold objects

IWBAT assess experimentally the final temperature when two liquids of different temperatures are mixed, calculate the heat lost and the heat gained of two objects after they are placed in thermal contact, discover if energy is conserved when two objects are placed in thermal contact and reach an equilibrium temperature, and explain the concept of entropy as it relates to objects placed in thermal contact.

6.7 Laws of Thermodynamics: Too hot, too cold, just right (p.664)

5/23/14

Entropy: the tendency of a system to move from order to disorder

As we increase the temperature of an object, we increase the disorder of the molecules

order → disorder

solid → (melt) liquid → (boil) gas

solid → gas: Sublimation

IWBAT assess experimentally the final temperature when two liquids of different temperatures are mixed, calculate the heat lost and the heat gained of two objects after they are placed in thermal contact, discover if energy is conserved when two objects are placed in thermal contact and reach an equilibrium temperature, and explain the concept of entropy as it relates to objects placed in thermal contact.

6.7 Laws of Thermodynamics: Too hot, too cold, just right (p.664)

5/23/14

Checking Up (p.672) #1-4

Physics to Go (p.676) # 2 & 4

IWBAT assess experimentally the final temperature when two liquids of different temperatures are mixed, calculate the heat lost and the heat gained of two objects after they are placed in thermal contact, discover if energy is conserved when two objects are placed in thermal contact and reach an equilibrium temperature, and explain the concept of entropy as it relates to objects placed in thermal contact.

6.8 Energy Consumption: Cold Shower (p.678) 5/27/14

WDYS Person taking a hot shower, boiling water/cooking on the stove, laundry (wash), hot water running in the sink, washing car w/hot water, making coffee

WDYT Time that the coil is on, amount of H_2O starting temp of H_2O, size of the coil, how hot the coil gets, ending temp of the H_2O

6.8 Energy Consumption: Cold Shower (p.678) 5/27/14

IWBAT calculate the heat gained by a sample of water, calculate the electrical energy converted into heat by a resistor, calculate the efficiency of a transformation of electrical energy to heat, and explore the power ratings and energy consumption levels of a variety of electrical appliances. I will do this through team experiments and discussions with my team and the whole class. I will demonstrate my understanding through answering questions in the Physics Talk, Checking Up, and/or Physics to Go.

6.8 Energy Consumption: Cold Shower (p.678) 5/27/14

Investigate

Follow ALL safety precautions.

Key Pad
Degree Symbol (°) ALT+0176

IWBAT calculate the heat gained by a sample of water, calculate the electrical energy converted into heat by a resistor, calculate the efficiency of a transformation of electrical energy to heat, and explore the power ratings and energy consumption levels of a variety of electrical appliances.

6.8 Energy Consumption: Cold Shower (p.678) 5/27/14

Physics Talk (p.680)

Energy Consumption

$1\,W = 1\,J/s$

$1\,kW = 1000\,W$

$1\,kWh = 1000\,W \times 1\,h$

$1\,kWh = 1000\,W \times 3600\,s = 3{,}600{,}000\,W\cdot s$ (J)

$\Delta Q = mc\Delta T$

$E = P \cdot t \quad P = V \cdot I \quad E = U \cdot I \cdot t$

IWBAT calculate the heat gained by a sample of water, calculate the electrical energy converted into heat by a resistor, calculate the efficiency of a transformation of electrical energy to heat, and explore the power ratings and energy consumption levels of a variety of electrical appliances.

6.8 Energy Consumption: Cold Shower (p.678) 5/27/14

Physics Talk (p.680)

Efficiency

$$\text{Efficiency} = \frac{\text{Useful energy}}{\text{Total energy}}$$

Energy Star

IWBAT calculate the heat gained by a sample of water, calculate the electrical energy converted into heat by a resistor, calculate the efficiency of a transformation of electrical energy to heat, and explore the power ratings and energy consumption levels of a variety of electrical appliances.

6.8 Energy Consumption: Cold Shower (p.678)

5/27/14

Checking Up (p.682) #1-4

Physics to Go (p.686) # 6

IWBAT calculate the heat gained by a sample of water, calculate the electrical energy converted into heat by a resistor, calculate the efficiency of a transformation of electrical energy to heat, and explore the power ratings and energy consumption levels of a variety of electrical appliances.

6.9 Comparing Energy Consumption: More for Your Money (p.691)

5/29/14

WDYS A woman (tired, just woke up) trying to make coffee using multiple ways to heat water for coffee She is looking at her watch, each method has a timer

WDYT yes – you will run it less so your bills will be lower because you will use less energy

6.9 Comparing Energy Consumption: More for Your Money (p.691)

5/29/14

IWBAT measure and compare the energy consumed by appliances; compare the costs of operating a variety of electrical appliances in terms of power ratings, amount of time each appliance is used, and billing rate; and distinguish among the three ways of heat transfer. I will do this through team experiments and discussions with my team and the whole class. I will demonstrate my understanding through answering questions in the Physics Talk, Checking Up, and/or Physics to Go.

6.9 Comparing Energy Consumption: More for Your Money (p.691)

5/29/14

Investigate

Be very careful of the hot water.

There will be three methods of heating water.

Each will be done only once and teams will share data.

$$1\ \text{W}\cdot\text{s} \cdot \frac{1\ \text{kW}}{1000\ \text{W}} \cdot \frac{1\ \text{hr}}{3600\ \text{s}} =$$

IWBAT measure and compare the energy consumed by appliances; compare the costs of operating a variety of electrical appliances in terms of power ratings, amount of time each appliance is used, and billing rate; and distinguish among the three ways of heat transfer.

6.9 Comparing Energy Consumption: More for Your Money (p.691)

5/29/14

Physics Talk (p.693)

Determining Energy Consumption

Energy = Power × time of use

IWBAT measure and compare the energy consumed by appliances; compare the costs of operating a variety of electrical appliances in terms of power ratings, amount of time each appliance is used, and billing rate; and distinguish among the three ways of heat transfer.

6.9 Comparing Energy Consumption: More for Your Money (p.691)

5/29/14

Heat Transfer

Conduction – the transfer of energy from the warmer object to the cooler object via direct contact – between objects & within a substance

Convection – the transfer of heat via a gas or a liquid

Radiation – the transfer of heat via electromagnetic waves

IWBAT measure and compare the energy consumed by appliances; compare the costs of operating a variety of electrical appliances in terms of power ratings, amount of time each appliance is used, and billing rate; and distinguish among the three ways of heat transfer.

6.9 Comparing Energy Consumption: More for Your Money (p.691)

5/29/14

Checking Up (p.695) #1, 2, 4, & 6

Physics to Go (p.686) # 1, 3, 4, & 10

IWBAT measure and compare the energy consumed by appliances; compare the costs of operating a variety of electrical appliances in terms of power ratings, amount of time each appliance is used, and billing rate; and distinguish among the three ways of heat transfer.

Unit 6 Chapter Challenge (due Tuesday, 6/3/14)

Appliance packages: Basic needs (universal)
Option Packages (2): Climate, Luxury, Family Size

Power usage: Maximum 3 kWh/day
Maximum 2400 W at one time

Instructions on how to use appliances to not exceed the limitations of the system.

Must be turned in in writing.

All participants to receive credit for the project must be named on the title page.